BREEDING OF THE ETHIOPIAN SWALLOW *HIRUNDO AETHIOPICA* IN INTERIOR KENYA

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The Ethiopian Swallow *Hirundo aethiopica* (hereafter called the 'swallow') is a resident of the Afrotropical region that occurs across the northern tropics from Niger and Benin to Ethiopia and Somalia and thence southwards to East Africa (Hall & Moreau 1970). It has been extending its range southwards into East Africa during recent decades. Thus Jackson (1938) noted it south along the Nile valley to Kajo Kagi (3.53N, 31.40E) on the southern borders of the Sudan, but could find only three records for interior Kenya and none at all for Uganda. Since then, however, numerous sight records have shown its advance south to the equator in Uganda and to eastern areas of Tanzania, south to 10 degrees South (East African Natural History Society (EANHS) Nest Record card, Britton 1980, Lewis & Pomeroy in prep.). Since all but one of the few breeding records for the interior of East Africa are on substantial buildings (Benson 1945, EANHS Nest Record cards, pers. obs.), this extension southwards may have been due, at least in part, to the increased use of relatively large and permanent, European-style buildings, on which nests can be built in relatively inaccessible situations.

It has been known for many years as a breeding species along the Kenya coast (e.g. records in Cunningham-van Someren 1971), while more recent observations detail its breeding under coral overhangs, on buildings and inside sea caves (EANHS Nest Record cards, Dyson 1971, Lee 1971, Brown & Britton 1980). Association with similar structures, and breeding on or near the coast, is also known from southern Somalia at latitudes 1 to 3 degrees N (Ash & Miskell 1983) and from interior eastern Tanzania at 3 and 10 degrees S (EANHS Nest Record cards).

Less is known about its status in the interior of Kenya. It has been observed in many parts of the country north of the equator and this population may be discrete from that on the coast (Lewis & Pomeroy in prep.). The sole breeding records for these areas appear to be those of Benson (1945) who, in 1941, observed it inside European houses at Moyale (3.32N, 39.03E) on 11 March, at occupied nests at Marsabit (2.17N, 37.57E) in late May and at an occupied nest attached to an overhanging rock at a waterhole at Archer's Post (0.39N, 37.41E) on 21 May.

In the course of researches associated with the Kenya bird atlas (Lewis & Pomeroy in prep.), LG reported regular nesting of the species on her house at El Karama Ranch, Laikipia District (0.12N, 36.55E, 1740 m). This paper summarizes these new records from Laikipia and describes aspects of the breeding biology. All observations derive from the farm buildings at El Karama Ranch. The 'study pair' use the 'study nest' in LG's living room and have received the most observation. The data are compared with those for the Eurasian Swallow *H. rustica* (Ingram 1974, Sharrock 1976, Tate 1981, Witherby *et al.* 1938), a member of the same superspecies (Hall & Moreau 1970) which also uses manmade structures for breeding. Data extracted from EANHS Nest Record cards filled in by H.A. & P.L. Britton, W.G. Dyson, H.J. Lee, C.F. Mann, S. Sassoon, D.A. Turner and V.G.L. van Someren are acknowledged as 'EANHSNRC'.

THE BREEDING IN THE EL KARAMA AREA

The swallow has been at least attempting to breed at El Karama since 1969,

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when LG came to live there. Successful breeding was taking place in 1977 when more concerted observation of the birds began, and probably before that. Although quantitative data are lacking, the numbers of pairs and their overall breeding success have shown a steady increase up to the present day, which may reflect the species' continued southward spread and/or the expansion of the successful El Karama population.

In the stables, the swallow has largely replaced the White-rumped Swifts *Apus caffer*, Little Swifts *A. affinis*, Striped Swallows *Hirundo abyssinica* and Mosque Swallows *H. senegalensis* that bred there formerly, and it is spreading to other buildings on the farm. Although they may do so, the swallows have never been seen to exhibit aggression towards any of these other species, in fact quite the reverse. Little Swifts, which were not occupying any nest in the immediate vicinity, caused the death of a swallow brood by chasing the parents so persistently that they deserted, and knocked a nestling out of the nest. This nest is, however, now being used successfully by swallows.

The conditions and habitat at El Karama are by no means unique and it would be surprising if other colonies do not exist elsewhere on the Laikipia plateau. We have received several reports of breeding from the area between Rumuruti, Nanyuki and Maralal, but have not been able to confirm any of them personally.

SONG AND THE INITIATION OF NESTING

Prior to normal 'long' rains breeding, the birds start to sing in January and may continue for a long period before nest building begins. The full song may be given in flight, but is more frequently uttered from a perch. Song ceases before hatching and does not resume, at least in the study pair, before the second clutch. As noted by Mackworth-Praed & Grant (1960) the song is loud and as remarkably varied as that of a canary *Serinus* sp., consisting of long and sustained periods of constantly varied but fairly similar phrases. The notes are squeaky but melodious, not of a great range of frequency but nevertheless very pleasant to the ear. A very quiet and introspective, but otherwise fully developed, version of the song given by a solitary, perched bird was apparently a subsong, or possibly the soft twittering of the female mentioned by Archer & Godman (1961).

After song begins, in some cases long after, the pair brings more lining materials to a pre-existing nest and roosts near it or, in the case of a new site, near the place where they intend to build. At the Kenya coast, a pair intermittently perched near an old nest from mid February onwards, with incubation starting on 1 April (EANHSNRC). Although there is always some wet mud around the farmhouse at El Karama, building only begins with the onset of wet weather, as noted for several members of this genus by Brown & Britton (1980); this is presumably because, regardless of the constant presence of nest material due to domestic water, only widespread rain will stimulate the production of sufficient insect prey. This is usually during the April-July 'long' rains, but breeding may occur at other times as, for example, during the unseasonal rains of January 1983; prolonged unseasonal rain in September 1983 did not promote breeding, however. Nests may be built and then remain unused if the weather becomes unfavourable, while some nests can even remain unused when breeding is successfully underway in the rest of the colony.

THE COMPOSITION AND STRUCTURE OF THE NEST

The nests are built of sticky wet mud pellets reinforced with dry grass. The

structure is an open cup and building is started at the base, and thence up the sides to form a horseshoe shape, which is finally walled-in across the front. As in the Eurasian Swallow (Tate 1981), most building activity occurs in the morning, which enables the construction to dry and harden in the heat of the day to prevent collapse. Higher overall temperatures must render this factor less important in the tropics, however, and some building is also seen at El Karama in the afternoons. The nest is then lined with rootlets, dry grass, hair from horses and cattle and with feathers, these materials being identical to those used by the Eurasian Swallow (Tate 1981). At the Kenya coast, coconut fibre, palm leaf fibre and possibly seaweed are also used (EANHSNRC). One bird at El Karama carried a hair approximately one metre long; this material can be a source of young mortality, as for example when an immature was hanged by its neck below its nest in a loop of hair, and when another flying young was hobbled to its nest by a strand around its legs.

The constituents of a failed nest were analysed. This nest was rather larger than average for this species at El Karama: its open, roughly circular top measured 10 x 8 cm and it was 13 cm deep, its overall shape being an inverted cone, flattened on the side on which it was attached, unsupported, on to the side of a vertical beam. The cemented part of this nest consisted of soil material ranging in grain size from mud (below 0.15 mm) to a few rock grains over 3.35 mm in diameter, together with vegetable material that was predominantly dry grass and rootlets. Inside this was an outer 'foundation' lining consisting of dry grass, rootlets and a very few down feathers, the outer parts of this material being cemented into the inner side of the nest's mud wall. As its name implies, this foundation lining seems to provide a firm support within the nest for the more fragile inner lining. This outer lining is absent in nests built on wooden shelves (see Nest building and situation, below), where the shelf itself provides a competent, horizontal foundation. This outer lining enclosed an inner one of dry grass, feathers and hair that surrounded an open cup 4 cm in diameter. The composition of the inner lining, in terms of numbers of constituent particles, was approximately 75 per cent pieces of dry grass over 2 cm long, 12 per cent feathers over 2 cm long, 8 per cent rootlets, 4 per cent animal hair and 1 per cent twine, human hair and shreds of plastic sacking.

The feathers were all from the feral chicken, and analyses of two other nests showed 93 per cent from this species and the remainder from the Helmeted Guineafowl *Numida meleagris,* domestic pigeons *Columba livia* and the White-bellied Go-away Bird *Corythaixoides leucogaster,* and 94 per cent this species and the remainder from domestic goose, Helmeted Guineafowl and a roller *Coracias* sp., respectively. This preference for chicken feathers has previously been noted for this species (EANHSNRC) and for Eurasian Swallow (Tate 1981), and presumably reflects abundance around the farm and other rural buildings on which these two birds breed. The Eurasian Swallow has a great preference for white feathers (Tate 1981), possibly because their colour makes them more conspicuous and easily found, but in two analysed nests at El Karama only 51 per cent and 63 per cent respectively of the feathers over 2 cm long were mainly this colour; relining of a nest with white feathers is described at the Kenya coast (EANHSNRC).

NEST BUILDING AND SITUATION

Nest building is undertaken by both members of the pair as in the Eurasian Swallow (Witherby *et al.* 1938) and is accomplished in about two weeks. At Entebbe, Uganda, the mud structure alone of a nest was constructed in five days (EANHSNRC). During building, either one or both members of the pair may

roost on the nest at night: this behaviour appears irregular and unpredictable and cannot be correlated either with the amount of the nest completed or with the prevailing weather conditions.

At El Karama, new nests have never been built on top of old ones as is often the case in the Eurasian Swallow (Ingram 1974), but old nests of other *Hirundo* and *Apus* species have been used as foundations for complete new nests. At the Kenya coast, one course of mud was added to an old nest that was about to be reused (EANHSNRC), and broken nests at El Karama have been repaired before re-use. The swallows also clean and reline old nests before use and any nest, whether old or new, before the production of a second brood; cleansing prior to a second brood has also been recorded on the Kenya coast (EANHSNRC). These measures presumably serve to reduce parasite infestation.

The nests are either built inside buildings, e.g. in the stables and living quarters, or in sheltered situations on buildings' exteriors, e.g. under eaves and at the back of verandahs. The birds are characteristically tame (see, for example Mackworth-Praed & Grant 1960), but react to domestic cats and dogs as soon as nest building has started. No nests have been found on natural structures, such as trees. In contrast to the habit of the Eurasian Swallow (Ingram 1974), the nests are mostly unsupported from below, and are built on surfaces that range from vertical to approximately 60 degrees above the horizontal, e.g. the vertical sides of roof beams and the undersides of sufficiently inclined roofs; nests can also be attached to free-dangling structures, e.g. a decorative rafia mat, and a bark sliver hanging from the underside of a wooden roof tile. Nests supported from below are rarer. Thus the study nest is at the junction of two walls and supported below by the picture rail, while a number of nests are supported by shelves erected on the verandah specifically for this purpose. Nesting at the Kenya coast occurred in an old coconut shell, also hung up specifically for the purpose (EANHSNRC).

THE EGGS

Clutch size varies from two to four, with possibly only a single egg at times, and two broods per season are usual. This compares to 14 clutches from the Kenya coast which averaged 2.7 (50 per cent of the sample = C3), but is slightly below the C3 or C4 or sometimes more quoted by Mackworth-Praed & Grant (1960) and the four clutches averaging 3.75 quoted by Archer & Godman (1961) for Somalia. In the study nest, one egg per day was laid until the clutch of four was complete, when incubation began.

An egg measured 18 x 13 mm, which compares to 18.03 x 13.08 mm quoted for Nigeria (Jackson 1938), 19 x 12.5 mm (Mackworth-Praed & Grant 1960, area unspecified), and 17.5 x 13.5 mm for Somalia (Archer & Godman 1961). The eggs are white tinged very faintly pink, with chestnut blotches and speckles of varying intensity which are concentrated in a poorly defined band around the blunt end and more thinly distributed over the rest of it. This colouration and patterning agrees with published descriptions, and to the eggs of other members of the superspecies (National Museum collection, Nairobi, Mackworth-Praed & Grant 1960).

INCUBATION AND BROODING

Incubation takes around two weeks (Table 1), which is very similar to the 14-16 days of the Eurasian Swallow (Tate 1981). The individual birds of the study nest pair can be recognized by minor plumage differences, and in this pair one bird carries out at least the bulk of incubation and brooding while

the other roosts elsewhere. Recent colour marking of one of this pair confirms this conclusion. If analogy with the Eurasian Swallow (Witherby *et al.* 1938, Tate 1981) is correct, it is the male that takes little part in these activities, but the sexes of the birds at El Karama cannot be distinguished. Whether hatching is simultaneous or sequential is uncertain, but the young are ready to leave the nest together.

THE YOUNG

The young are fed initially on material regurgitated by the parents and later on small flying insects held in the parents' bills. The parents do not always feed the chick that gapes widest or cries loudest, and may persistently push others aside to reach ones obscured at the back of the nest.

The young are fed almost continuously from dawn to dusk and, as in the Eurasian Swallow (Witherby *et al.* 1938), both parents assist; feeding becomes more intermittent, i.e. with the parents absent for periods of up to 30 min, if unseasonal dry weather, and thus paucity of food, occurs after hatching, as in June 1984. On 12 June 1983, the study nest young received ten feeds between 06:10 and 06:35, which is within the feeding rate quoted for the Eurasian Swallow in Germany (Tate 1981), and both parents arrived at the nest simultaneously on a number of occasions. This pair still brings food after the oil lamps are lit at dusk.

The parents swallow some faecal sacs and remove others. They continue to remove sacs from the nest even after the young, at about one week old, are able to back over the edge of the nest to defaecate normally. Sacs from the study nest are carried over 10 m away, and are invariably deposited outside the house.

For some days before flying, the young cling to the edge of the nest. Three of four young left the study nest 25 days after hatching, which is slightly longer than the 17 - 23 days quoted for the Eurasian Swallow (Tate 1981). The fourth chick of this brood left the nest, possibly accidentally, at 21 days, when it could certainly fly, but was killed by a domestic cat. Dated events for this brood are given in Table 1.

TABLE 1

Dated breeding phenomena at the study nest, 1983

	Running days	Cumulative days
5 May: C4 completed and incubation started	13	0
18 May: first egg (possibly all eggs) hatched	6	13
24 May: first audible sounds from chicks	15	19
8 June: first nestling flew - killed by cat	4	34
12 June: other three flew successfully	18	38
30 June: first egg of second clutch laid	-	56

Most young at El Karama fledge and fly in June and July, after normal 'long' rains. After their first flight and as in the Eurasian Swallow (Witherby *et al.* 1938), the young spend the nights roosting on or beside their nest for a week or possibly longer, though records from the Kenya coast suggest that this may not always be the case (EANHSNRC). While there is no certain evidence for the co-operative feeding of the young by the immatures of earlier broods, as there is in a few cases in the Eurasian Swallow (Tate 1981),

immature birds can show an interest in later broods. Three free-flying immatures persistently perched near, and showed an interest in, a brood still in the study nest; the study pair persistently chased these immatures away from the nest but would perch normally with them away from the vicinity of the nest. When the brood flew, these immatures flew around with the parents, calling to them.

BEHAVIOUR OUTSIDE THE BREEDING SEASON

After the breeding season the swallows remain in the broad vicinity of the colony, and there is no noticeable diminution in numbers to suggest even limited dispersal or migration. They spend the days feeding out over the surrounding bush, particularly the more open areas, and return at dusk to roost on or near the nests. The study nest pair roosted at precisely the same site near their nest and in the same positions relative to each other throughout the non-breeding season, while their progeny roosted elsewhere.

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